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- (71) Applicant (for all designated States except US): INNOVATIVE SYSTEM DESIGN INC. [US/US]; 130 Campus Drive, Edison, NJ 08837 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): WAGNER, Lorelei [US/US]; Edison, NJ (US). NOCERA, David [US/US]; 809 Quarry Lane, Martinsville, NJ 08836 (US).
- (74) Agents: SAMUEL, Richard et al.; Goodwin Procter LLP, 103 Eisenhower Parkway, Roseland, NJ 07068 (US).
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(54) Title: APPARATUS, METHOD, AND ARTICLE OF MANUFACTURE FOR VISUALIZING STATUS IN A COMPUTE ENVIRONMENT

(57) Abstract: There is provided herein an exemplary technique utilizing at least one application status icon for visualizing the status of important metrics of, e.g., one or more applications running within a compute infrastructure. In an exemplary embodiment, the application status icon is located on a device display, preferably as part of a graphical user interface icon tray, such as Microsoft® Windows® system tray. To generate the appropriate color of the application status icon, several predefined test or database queries are executed to determine the status of a desired application. Thereafter, the determined status is compared to a plurality of threshold conditions, which determine the state of a given status metric and contribute to the overall color of the application status icon, preferably located on the display device. Thus, a user or manager need not run an application to check its status. Instead, the manager need only view the color of the application status icon on the display device to determine the overall health of a plurality of underlying metrics, which contribute to the creation of the application status icon's color.

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1 TITLE

2 Apparatus, Method, and Article of Manufacture for Visualizing Status in a
3 Compute Environment

4

5 INVENTOR

6 David Nocera

7

8 CROSS REFERENCE TO RELATED APPLICATION(S)/CLAIM OF
9 PRIORITY

10 This application claims the benefit of priority of US Application No,
11 60/439,696, filed January 13, 2003, which is incorporated in its entirety herein.

12

13 STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR
14 DEVELOPMENT

15 Not applicable.

16

17 REFERENCE OF AN APPENDIX

18 Not applicable.

19

20 FIELD OF THE INVENTION

1 The present invention relates generally to compute and/or network
2 management and more particularly to an improved system, method, apparatus, and
3 article of manufacture for graphically reporting status on a compute infrastructure.
4

5 BACKGROUND OF THE INVENTION

6 Heretofore, compute infrastructure status visualization techniques involve
7 the use of multiple and various applications that are generally specialized, large
8 and complex, all monopolizing desktop resources and usually requiring special
9 training. Determining status on important metrics such as business, application,
10 and technology or production issues involves interaction with one or more of
11 these complex applications, multiple key strokes and complex application
12 interaction to generate reports, which are then consolidated from multiple sources
13 and summarized for management. The process is often time-consuming and
14 cumbersome and requires special training and skills. Furthermore, the existing
15 applications are geared for proficient computer or network operators, not
16 managers. Because of time constraints, busy managers generally do not have
17 time to even review the summary reports.

18 Accordingly, what is needed is a further summary of the summary report.
19 That is, a comprehensive way to visualize status on a compute infrastructure, and
20 more particularly, a simple solution that detects status from multiple sources or

1 metrics, consolidates them, summarizes what it consolidated and displays the
2 entire status as a single icon on a manager's display device - desktop, from which
3 the underlying detail can be displayed via drilldown. The drilldown should
4 include certain critical information, so that managers can take appropriate action
5 when necessary.

6

7 SUMMARY OF THE INVENTION.

8 The present solution addresses the aforementioned problems of the prior
9 art by providing for, among other things, an improved apparatus, method and
10 article of manufacture for visualizing status of important metrics. Specifically,
11 there is provided herein an exemplary technique utilizing at least one status icon
12 for visually reporting the status of at least the important metrics of a resource, e.g.,
13 one or more applications running within a compute infrastructure. In an
14 exemplary embodiment, the application status icon is located on a device display,
15 preferably as part of a graphical user interface icon tray, such as Microsoft®
16 Windows® system tray. To generate the appropriate color of the application
17 status icon, several predefined tests or database queries are executed to determine
18 the status of a desired application. Thereafter, the determined status is compared
19 to a plurality of threshold conditions, which determine the state of a given status
20 metric and contribute to the overall color of the application status icon, preferably

1 located on the display device. Thus, a user or manager need not run an
2 application to check its status. Instead, the manager need only view the color of
3 the application status icon on the display device to determine the overall health of
4 a plurality of underlying metrics, which contribute to the creation of the
5 application status icon's color.

6 If a problem exists with any metric color of the single main application,
7 the icon changes from good to bad. A problem is defined as one or more metrics
8 falling outside the range of a predefined and acceptable threshold condition. Upon
9 drilldown, the color of the icon used to present the metric is also changed from
10 good to bad.

11

12 BRIEF DESCRIPTION OF THE DRAWINGS

13 Referring briefly to the drawings, embodiments of the present invention
14 will be described with reference to the accompanying drawings in which Figures
15 1, 2 and 3 illustrate certain aspects and features of the present solution.

16

17 DETAILED DESCRIPTION OF THE INVENTION

18 Referring more specifically to the drawings, for illustrative purposes the
19 present invention may be embodied in the graphical image/interface, method of
20 operation and article of manufacture or product, generally shown in Figures 1, 2

1 and 3. It will be appreciated that the graphical image/interface, method of
2 operation and article of manufacture may vary as to the details of its representative,
3 icons (a square may be a circle), configuration (the exact screen layout may be
4 adjusted) and operation without departing from the basic concepts disclosed
5 herein. The following description, which follows with reference to certain
6 embodiments herein, is, therefore, not to be taken in a limiting sense.

7 There is provided herein an exemplary method utilizing at least one status
8 icon for visually reporting the status of at least the important metrics of a resource,
9 e.g., one or more applications running within a compute infrastructure. The status
10 icon also implements a real time summary drill-down status report of the resource,
11 e.g. an application. In an exemplary embodiment, the status icon is located on a
12 device display, preferably as part of a graphical user interface icon tray, such as
13 Microsoft® Windows® system tray.

14 Figure 1 depicts the status icon as part of the Microsoft® Windows®
15 system tray. The icon can be programmed to summarize the state of multiple
16 metrics over various time intervals. For example, at Time 1, 2 and 3, the status
17 icon is red, reflecting a bad state. At Time 4, the status icon is green, reflecting a
18 good state. Preferably, a single graphical icon is utilized to summarize the state of
19 the underlying metrics within a compute infrastructure. Thus, if the icon is green,
20 thus indicating a good state, management can be assured that the important

1 metrics of the given resource(s) are good. Alternatively, if the icon is red, thus
2 indicating a bad state, management can take action with the appropriate people.

3 Figure 2 depicts the first level of drilldown for taking action when the icon
4 is red, thus indicating a bad state. The first level of drilldown for taking action is
5 the main status window/object (hereinafter referred to as application main status
6 screen). The application main status screen is accessed and displayed when the
7 user selects/clicks on the status icon. Each metric icon displayed in the
8 application main status screen, represents a single metric or a container of
9 multiple metrics. The states of the metrics contribute collectively to the overall
10 state reported by the status icon. A single metric might also be associated with a
11 test or query that can aggregate multiple "hidden" metrics and summarize the
12 results into a single value (e.g. Service Levels).

13 Figure 2 also depicts the various resources/applications running on the
14 computing device. Many of these applications are also depicted in the system tray
15 together with the status icon. Using the system tray elevates the executive level
16 attention for metrics contained in this application, constantly reporting their status
17 in real time. This allows the status for important issues, reflected in the state of
18 important metrics to be elevated above the "noise" of the other applications on the
19 busy display device.

1 Also shown in Figure 2, prior use of the system tray uses single icons to
2 represent the state of single applications (e.g. NetMeeting) or monitors (e.g. CPU
3 Usage). This invention uses a single icon to represent the state of multiple and
4 dissimilar metrics from multiple and dissimilar sources, presented and
5 summarized to management as a single icon. This makes better use of the system
6 tray, leveraging the fact that the system tray is always visible, to allow important
7 metrics to also always be visible to management.

8 Figure 3 depicts self explanatory details that are used to manage metrics.
9 Not illustrated, but disclosed is the graphing of historical metric data in a variety
10 of formats (e.g. line, bar, pie) charts.

11 In accordance with another aspect of the present invention, there is
12 provided an exemplary system, method, apparatus and product for visualizing
13 status on a compute infrastructure wherein an application is used as a container
14 for important metrics to be managed by an application.

15 In accordance with another aspect of the present invention, there is
16 provided an exemplary system, method, apparatus and product for visualizing
17 status on a compute infrastructure wherein a main status icon for the application is
18 provided on a display device associated with a device running Microsoft's
19 Windows-based operating system. The icon is preferably displayed as part of the

1 Windows System Tray and may also be positioned ahead of other icons in the
2 System Tray.

3 In accordance with another aspect of the present invention, there is
4 provided an exemplary system, method, apparatus and product for visualizing
5 status on a compute infrastructure wherein the main status icon is an iconized
6 (minimized) Windows application, or any application in a windowing
7 environment (e.g. X Windows).

8 In accordance with another aspect of the present invention, there is
9 provided an exemplary system, method, apparatus and product for visualizing
10 status on a compute infrastructure wherein the color of the main status icon
11 changes to reflect the underlying state of important metrics associated with the
12 application.

13 In accordance with another aspect of the present invention, there is
14 provided an exemplary system, method, apparatus and product for visualizing
15 status on a compute infrastructure wherein the metrics are configurable.

16 In accordance with another aspect of the present invention, there is
17 provided an exemplary system, method, apparatus and product for visualizing
18 status on a compute infrastructure wherein the conditions that trigger the changed
19 state of a metric are configurable.

1 In accordance with another aspect of the present invention, there is
2 provided an exemplary system, method, apparatus and product for visualizing
3 status on a compute infrastructure wherein the application can manage other
4 instances of itself, as a container of metrics or other instances of the application.

5 In accordance with another aspect of the present invention, there is provided an
6 exemplary system, method, apparatus and product for visualizing status on a
7 compute infrastructure wherein the specific colors of the main icon represent
8 multiple levels of severity conditions.

9 In accordance with another aspect of the present invention, there is
10 provided an exemplary system, method, apparatus and product for visualizing
11 status on a compute infrastructure wherein the specific shape or image of the main
12 icon represent multiple levels of severity conditions.

13 In accordance with another aspect of the present invention, there is
14 provided an exemplary system, method, apparatus and product for visualizing
15 status on a compute infrastructure wherein ignored metrics do not contribute to
16 the color of the main icon.

17 In accordance with another aspect of the present invention, there is
18 provided an exemplary system, method, apparatus and product for visualizing
19 status on a compute infrastructure wherein the metrics can be ignored based upon
20 time (such as a snooze alarm)

1 In accordance with another aspect of the present invention, there is
2 provided an exemplary system, method, apparatus and product for visualizing
3 status on a compute infrastructure wherein the main icons are modifiable and
4 animated.

5 In accordance with another aspect of the present invention, there is
6 provided an exemplary system, method, apparatus and product for visualizing
7 status on a compute infrastructure wherein a click (or drilldown) on the icon
8 shows at least one list of icons that contain either at least one metric, or at least
9 one icon representing another instance of the application (which may be reflecting
10 more applications or more metrics).

11 In accordance with another aspect of the present invention, there is
12 provided an exemplary system, method, apparatus and product for visualizing
13 status on a compute infrastructure wherein individual metrics are populated as a
14 result of running tests on a compute infrastructure.

15 In accordance with another aspect of the present invention, there is
16 provided an exemplary system, method, apparatus and product for visualizing
17 status on a compute infrastructure wherein a single test can aggregate the results
18 of multiple important things, into a metric of higher importance (e.g. Service
19 Level Compliance).

1 In accordance with another aspect of the present invention, there is
2 provided an exemplary system, method, apparatus and product for visualizing
3 status on a compute infrastructure wherein individual metrics are the result of
4 queries to a predefined dynamic updatable database.

5 In accordance with another aspect of the present invention, there is
6 provided an exemplary system, method, apparatus and product for visualizing
7 status on a compute infrastructure wherein the display name of the test, as viewed
8 by the user, can be different from the actual test name as required to gather
9 information.

10 In accordance with another aspect of the present invention, there is
11 provided an exemplary system, method, apparatus and product for visualizing
12 status on a compute infrastructure wherein the details describing the test and
13 thresholds are configurable.

14 In accordance with another aspect of the present invention, there is
15 provided an exemplary system, method, apparatus and product for visualizing
16 status on a compute infrastructure wherein the contact information including but
17 not limited to a business owner and the a trouble ticket assignee is displayable.

18 In accordance with another aspect of the present invention, there is
19 provided an exemplary system, method, apparatus and product for visualizing

1 status on a compute infrastructure wherein an Alert, Alarm or Fault is associated
2 with each metric, coming from one of many trouble ticket systems.

3 In accordance with another aspect of the present invention, there is
4 provided an exemplary system, method, apparatus and product for visualizing
5 status on a compute infrastructure wherein the status of the Alert, Alarm or Fault
6 is tracked, including but not limited to Alert Level, Priority, Creation Data, Ticket
7 Number, Assignee.

8 In accordance with another aspect of the present invention, there is
9 provided an exemplary system, method, apparatus and product for visualizing
10 status on a compute infrastructure wherein the historical performance of the
11 metric can be observed.

12 In accordance with another aspect of the present invention, there is
13 provided an exemplary system, method, apparatus and product for visualizing
14 status on a compute infrastructure wherein multiple levels of historical
15 performance can be observed (e.g. hourly, weekly, monthly).

16 In accordance with another aspect of the present invention, there is
17 provided an exemplary method of visualizing status on a compute infrastructure
18 wherein the method can be employed or embedded within any application, as a
19 means to report status within the application, for any metrics that is internal and/or
20 external to the application.

1 In accordance with another aspect of the present invention, there is
2 provided an exemplary system, method, apparatus and product for visualizing
3 status on a compute infrastructure wherein the main status icon can be located
4 anywhere on the display device.

5 In accordance with another aspect of the present invention, there is
6 provided an exemplary system, method, apparatus and product for visualizing
7 status on a compute infrastructure wherein the status icon need not be graphical
8 but can also consist of text, video, audio or a combination thereof.

9

10 CONCLUSION

11 Having now described an exemplary of the invention, it should be
12 apparent to those skilled in the art that the foregoing is illustrative only and not
13 limiting, having been presented by way of example only. All the features
14 disclosed in this specification (including any accompanying claims, abstract, and
15 drawings) may be replaced by alternative features serving the same purpose, and
16 equivalents or similar purpose, unless expressly stated otherwise. Therefore,
17 numerous other embodiments of the modifications thereof are contemplated as
18 falling within the scope of the present invention as defined by the appended
19 claims and equivalents thereto.

20 Moreover, the techniques may be implemented in hardware or software, or

1 a combination of the two. In one embodiment, the techniques are implemented in
2 computer programs executing on programmable computers that each include a
3 processor, a storage medium readable by the processor (including volatile and
4 non-volatile memory and/or storage elements), at least one input device and one
5 or more output devices. Program code is applied to data entered using the input
6 device to perform the functions described and to generate output information.
7 The output information is applied to one or more output devices.

8
9 Each program is preferably implemented in a high level procedural or
10 object oriented programming language to communicate with a computer system,
11 however, the programs can be implemented in assembly or machine language, if
12 desired. In any case, the language may be a compiled or interpreted language.

13 Each such computer program is preferably stored on a storage medium or
14 device (e.g., CD-ROM, hard disk or magnetic diskette) that is readable by a
15 general or special purpose programmable computer for configuring and operating
16 the computer when the storage medium or device is read by the computer to
17 perform the procedures described in this document. The system may also be
18 considered to be implemented as a computer-readable storage medium, configured
19 with a computer program, where the storage medium so configured causes a
20 computer to operate in a specific and predefined manner.

1 CLAIMS

- 2 1. A computer-implemented method of visually reporting the status of a resource
3 having one or more status metrics associated therewith, said resource
4 executing within a compute infrastructure, said method comprising:
5 generating a color changeable status icon associated with said resource;
6 associating a different color to said color changeable status icon to reflect the
7 underlying state of said one or more status metrics;
8 comparing said one or more status metrics to a plurality of threshold
9 conditions to determine the underlying state of said one or more status
10 metrics;
11 displaying the appropriate color of said application status icon based on said
12 comparison.
- 13 2. The method as in claim 1 wherein wherein the resource is used as a container
14 for important metrics to be managed by the resource.
- 15 3. The method as in claim 1 wherein wherein the status icon is provided on a
16 display device associated with a device running Microsoft's Windows-based
17 operating system; said icon is displayed as part of the Windows System Tray.
- 18 4. The method as in claim 1 wherein the status icon is an iconized (minimized)
19 Windows application, or any application in a windowing environment (e.g. X
20 Windows).

- 1 5. The method as in claim 1 wherein the metrics are configurable.
- 2 6. The method as in claim 1 wherein the conditions that trigger the changed state
3 of a metric are configurable.
- 4 7. The method as in claim 1 wherein the resource can manage other instances of
5 itself, as a container of metrics or other instances of the resource.
- 6 8. The method as in claim 1 wherein the specific colors of the status icon
7 represent multiple levels of severity conditions.
- 8 9. The method as in claim 1 wherein the specific shape or image of the status
9 icon represents multiple levels of severity conditions.
- 10 10. The method as in claim 1 wherein the status icon is modifiable and animated.
- 11 11. The method as in claim 1 wherein a click (or drilldown) on the icon shows at
12 least one list of icons that contain either at least one metric, or at least one icon
13 representing another instance of the application (which may be reflecting more
14 applications or more metrics).
- 15 12. The method as in claim 1 wherein the one or more metrics are determined as a
16 result of running tests on a compute infrastructure.
- 17 13. The method as in claim 1 wherein a single test can aggregate the results of
18 multiple important items, into a metric of higher importance (e.g. Service
19 Level Compliance).

- 1 14. The method as in claim 1 wherein said one or more metrics are the result of
2 queries to a predefined dynamic updatable database.
- 3 15. The method as in claim 1 wherein the display name of the test, as viewed by
4 the user, can be different from the actual test name as required to gather
5 information.
- 6 16. The method as in claim 1 wherein the details describing the test and thresholds
7 are configurable.
- 8 17. The method as in claim 1 wherein the contact information including but not
9 limited to a business owner and the a trouble ticket assignee is displayable.
- 10 18. The method as in claim 1 wherein an Alert, Alarm or Fault is associated with
11 each metric, coming from one of many trouble ticket systems.
- 12 19. The method as in claim 1 wherein the status of the Alert, Alarm or Fault is
13 tracked, including but not limited to Alert Level, Priority, Creation Data,
14 Ticket Number, Assignee.
- 15 20. The method as in claim 1 wherein the historical performance of the metric can
16 be observed.
- 17 21. The method as in claim 1 wherein multiple levels of historical performance
18 can be observed (e.g. hourly, weekly, monthly).
- 19 22. The method as in claim 1 wherein the status icon can be located anywhere on
20 the display device.

- 1 23. The method as in claim 1 wherein the status icon consists of graphics, text,
- 2 video, audio or a combination thereof.

3





Time	System Tray	State
1		State Bad
2		State Bad
3		State Bad
4		State Good

FIGURE 1

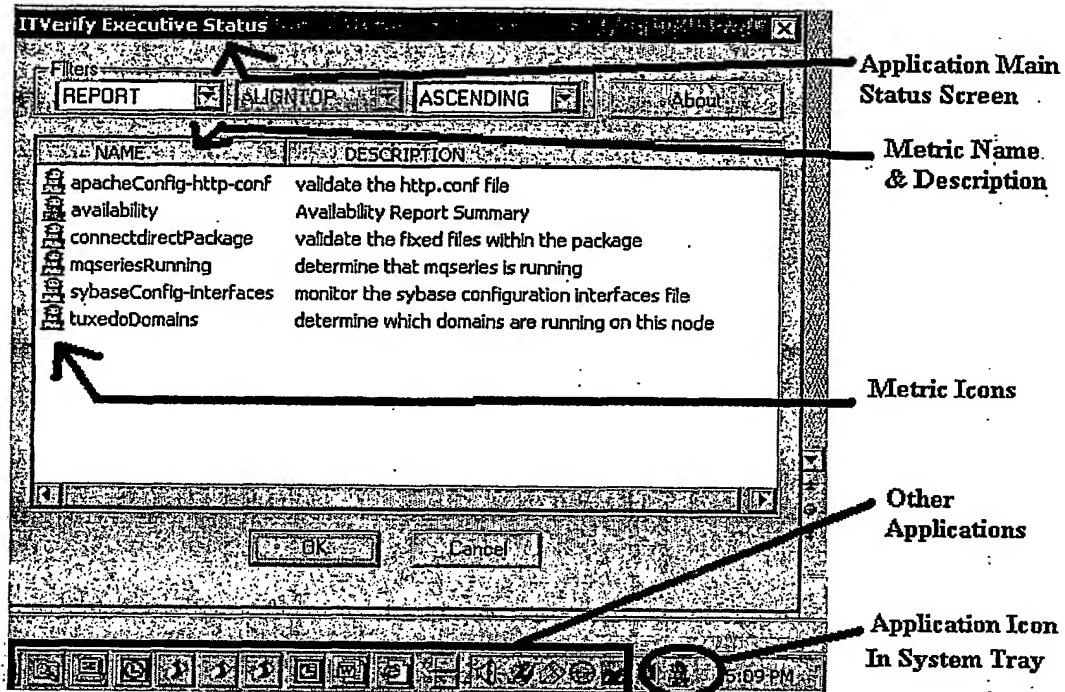


FIGURE 2

The screenshot shows a 'Details' window with the following sections and labels:

- Metric State:** Points to the 'Test' tab at the top left.
- Metric Name:** Points to the 'Availability' text in the top section.
- Metric Description:** Points to the 'Availability Report Summary' text in the top section.
- Trouble Ticket Details:** Points to the 'Alert' section, which includes:
 - Priority: Yellow
 - Created: 01/03/03 12:58
 - Updated: 01/03/03 14:29
 - Assignee: shekar, clippur@yahoo, Phone:
- Ticket Owner:** Points to the 'Assignee' field in the 'Alert' section.
- Metric Owner:** Points to the 'Contact Information' section, which includes:
 - Sharon Roban
 - Corporate Director
 - 903-999-1212
- Current Status:** Points to the 'Status' section, which includes:
 - This is status:
 - User Assignment Changed from 'un-assigned' to shekar/Attribute 'sla_availability' has been

At the bottom of the window are 'OK' and 'Cancel' buttons.

FIGURE 3